California Global Warming Solutions Act of 2006

Implementation of Mandatory Reporting of Greenhouse Gas Emissions

California Air Resources Board

June 20, 2008

Cal/EPA Headquarters, Sacramento

Agenda

- Introduction and Overview
  - Process and schedule
- Basic Reporting Requirements
  - What's new, preparing for reporting
- Overview of Reporting for General Stationary Combustion Sources
  - Combustion and cogeneration methods
  - Case example
- Review of Verification Requirements
- Questions and Comments

Participation Information

- Workshop materials:
  http://www.arb.ca.gov/cc/reporting/ghg-rep/ghg-rep.htm
- Regulation and Staff Report
  (includes proposed Regulation):
  http://www.arb.ca.gov/regact/2007/GHG2007/GHG2007.htm
- Webcast information:
  http://www.calepa.ca.gov/broadcast/
- Email comments during webcast:
  auditorium@calepa.ca.gov

Support Documentation, Reporting Tool and Training

- Sector-specific technical discussions
- Staff developing supporting documents
  - Present requirements in easy-to-follow format to guide reporting by sector
- Web-based GHG reporting tool
  - Beta testing Fall 2008
  - Tool to assist with reporting process
- Verifier training

Completing the Rulemaking Process

- Regulation approved by Board December 2007
- Modifications released for comment May 15 – June 5, 2008
- Staff reviewing comments, preparing responses as part of Final Statement of Reasons (FSOR)
- FSOR completion expected in July
- Subject to OAL approval, effective later this summer

Reporting Requirements

Regulation Organization

- Applicability – Who has to report
- Subarticle 1 – General Requirements
  - Definitions
  - General reporting requirements
  - Reporting and verification schedule
  - Record keeping, confidentiality, enforcement
- Subarticle 2 – Sector Specific Requirements
  - Cement, electric generating, retail providers, cogeneration, refineries, hydrogen plants, large stationary combustion sources

Regulation Organization (continued)

- Subarticle 3 – Calculation Methods for Multiple Sectors
  - CO_2 emissions from combustion using emission factors, heat content, carbon content, CEMS, etc.
  - CH_4 and N_2O emissions
  - Indirect energy use
- Subarticle 4 – Verification Requirements
- Appendix – Compendium of Emission Factors for reporting

Applicability (§95101):

- Cement plants
- Oil refineries ≥ 25,000 MT CO_2/yr
- Hydrogen plants ≥ 25,000 MT CO_2/yr
- Electric generating facilities (≥1MW & ≥2,500 MT CO_2)
- Electric retail providers and marketers
- Cogeneration facilities (≥1MW & ≥2,500 MT CO_2)
- Stationary combustion sources emitting ≥ 25,000 MT CO_2/yr

Exempt Sources

- Emergency & backup generators
- Portable equipment
- Hospitals, primary & secondary schools
- Nuclear, hydro, wind, solar generating facilities

Reporting: General Requirements (§95103(a))

- Annual reporting for each facility or entity subject to regulation
- The operator -- party with "operational control" – has reporting responsibility
- Report emissions for specified facility sources and gases by fuel type
  - Additional data as specified

What's New (since October 2007 proposal)

- Clarifications to text
  - Applicability, definitions, equations
- De minimis limit changed from 10,000 to 20,000 tonnes
- Interim data collection procedure during certain breakdowns
- All verification to begin in 2010

What's New (since October 2007 proposal)

- Fuel measurement accuracy revised from 2.5 percent to 5 percent
- Fuel consumption to be reported at process unit level where metered
- Test options added for waste-derived fuels
- Additional year for CEMS installation
- Verifiers also subject to deadlines

What's New (since October 2007 proposal)

- Power: specified out-of-state transactions optional, multijurisdictional reqts clarified
- Cogeneration: simplified reporting for small self-generation cogen facilities
- Refineries: CEMS, in-line monitoring options, fugitive emissions changes
- Hydrogen plants: mass balance equation corrected
- See Notice for more complete listing: http://www.arb.ca.gov/regact/2007/ghg2007/ghg2007.htm

Reporting Schedule

- Reports Due by April 1, 2009
  - General Stationary Combustion (except oil and gas sector)
  - Electricity Generating and Cogeneration Facilities not part of reports due June 1
- Reports Due by June 1, 2009
  - Petroleum Refineries
  - Hydrogen Plants
  - Cement Plants
  - Electricity Retail Providers and Marketers

Verification Schedule

- Verification optional for 2009 submittal
- Annual or triennial verification, based on sector
- When required, verification opinion due within 6 months following report due date (Oct. 1 or Dec. 1)

Preparing for Reporting: 2009

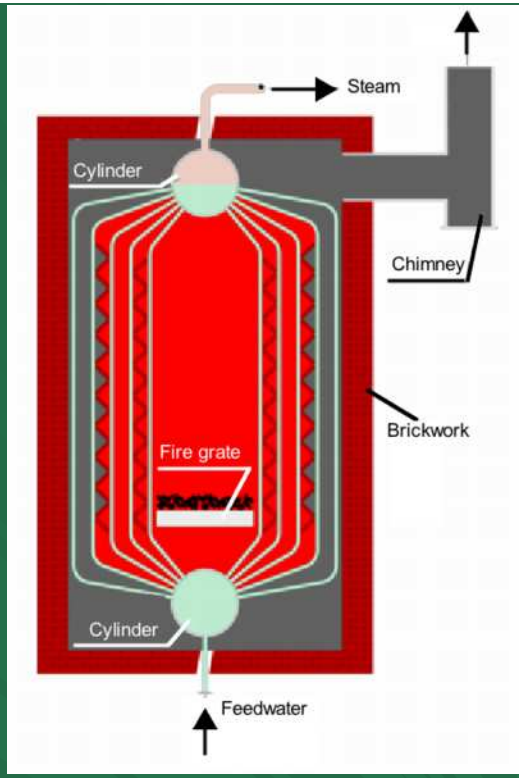
- Must report 2008 emissions in 2009
- Emissions calculations may be based on best available data and methods
  - Fuel usage by type x default emission factor
- Consider whether you want your 2009 report third-party verified

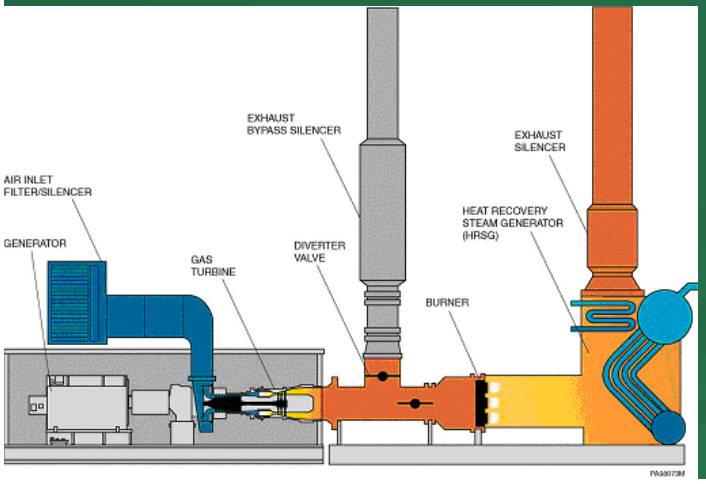
Preparing for Reporting: 2010

- 2010 report of 2009 emissions must meet full requirements of the regulation
- Complete installation of needed measurement devices by end of 2008
- Begin collecting fuel activity data measurements by January 1, 2009
- All reporters must verify the 2010 emissions data reports

Comments on general reporting requirements?

General Stationary Combustion Facilities (GSCs) (§95115)





GSC Facilities Overview

- 25,000 metric tonnes CO_2 from stationary combustion
  - Facility-wide threshold
  - Does not include process, mobile, indirect electricity or fugitive emissions
- Broad and diverse industry sectors
- Process emissions not required at this point

Meeting the Threshold

- Emissions based on single facility emissions only
  - Each facility counted separately even if multiple facilities under common ownership
- Threshold determination based only on CO_2 emissions from stationary combustion
  - Does not include purchased electricity, heating, cooling
  - Does not include mobile, fugitive, or process emissions

Major GSC Sectors Affected
(only if ≥ 25,000 metric tonnes/yr CO_2 from combustion)

- Natural gas transmission
- Industrial gases
- Paperboard manufacture
- Colleges and universities
- Oil production
- Food processing
- Steel foundries
- Mineral processes
- Glass container
- Malt beverages

How Will You Know If You Are a GSC Facility?

- ARB is working to inform all GSC facilities emitting ≥25,000 metric tonnes of CO_2 of requirements
- Fuel usage can be used to quickly approximate CO_2 emissions
  - Appendix A provides fuel usage and emissions factors to estimate CO_2 emissions

Approximating Emissions Based on Amount of Fuel Used

Fuel Type	Fuel Units	Kg CO_2/Unit	Amount of fuel to produce 25,000 MT CO_2	Amount of fuel to produce 2,500 MT CO_2
Natural Gas[1]	SCF	0.05	459,140,464	45,914,046
LPG (energy use)	Gal	5.79	4,317,757	431,776
Distillate Fuel	Gal	10.14	2,466,011	246,601
Motor Gasoline	Gal	8.80	2,841,174	284,117
Landfill Gas	MMBtu	52.03	480,503	48,050
Coal[2]	Short Ton	2,082.89	12,003	1,200
Jet Fuel	Gal	9.56	2,614,682	261,468
Kerosene	Gal	9.75	2,562,972	256,297
Petroleum Coke	MMBtu	102.04	244,996	24,500
Crude Oil	Gal	10.29	2,430,348	243,035

[1]Unspecified
[2]Unspecified Other Industrial

GSC Reporting Requirements

- Stationary combustion emissions estimation:
  - Calculate from fuel use and ARB default emission factors (§95125(a)-(b))

    or
  - Calculate using measured fuel heat value or carbon content (§95125(c)-(d), (h))

    or
  - Continuous emissions monitoring if available (§95125(g))

Calculating Stationary Combustion Emissions (EF)

- Stationary turbines, boilers, internal combustion engines, flares, etc.
- GSC Methodology:
  - Fuel use calculation

> *Total annual emissions = emission factor (i.e., emissions/fuel used) * annual fuel use (by each fuel type)*

- Regulation provides emission factors for various fuels (Appendix A)

Example ARB Emission Factors

Fuel	Kg CO_2/MMBtu
Bituminous Coal	93.40
Natural Gas (unspec.)	53.02
Distillate Oil/Diesel	73.10
Gasoline	70.83
Wood Waste	93.90
Biogas (includes CO_2 pass-through)	104.06

Source: ARB GHG Regulation, 15-day review draft, May 15, 2008

Other GSC Reporting Requirements

- Report indirect (purchased) energy use in KWh, Btu (emissions not required)
- Cogeneration as specified in §95112
- Electric generation as specified in §95111
- Oil and gas production sources required to test fuel

GSC Reporting Deadlines

- Data reports for GSCs due each April 1, beginning in 2009 for 2008 emissions
- Verification required on triennial schedule
- First due October 1, 2010 for 2009 emissions

What You Should Do Now GSCs

- Become familiar with regulation
  - §95103, 95104, 95112, 95115, Appendix A
- Sign up on ARB's email list serve
- Set up systems for tracking fuel and energy use during 2008
- Confirm availability of EFs for fuel (Appendix A)
- Evaluate need for fuel testing based on fuel types

Comments on GSC reporting requirements?

Cogeneration Facilities Reporting Requirements

(§95112)

Cogeneration Facilities: Mandatory Reporting

- Cogeneration includes Self-Generation Facilities
- $\geq$ 1 MW and $\geq$ 2500 metric tonnes CO_2
- Cogeneration Facilities in other Sectors
  - Refineries
  - Power/Utilities
  - Cement Plants
  - GSC $\geq$ 25,000 metric tonnes CO_2

Cogeneration Reporting

- Cogeneration Facility
  - Industrial structure, installation, plant, building, or self-generating facility
  - Sequential generation of multiple forms of useful energy in a single, integrated system.
- Responsible Reporting Party
  - Management/Operational Control

§95112(a) Greenhouse Gas Emissions Data Report

1) Facility Level and Generating Unit Information
2) Cogeneration System
3) Electricity Generation
4) Thermal Energy Production
5) Distributed Emissions
6) Indirect Electricity Usage

§95112(b) Calculation of CO_2, N_2O, and CH_4 Emissions

1) CO_2 Emissions from Stationary Combustion
   - 95111 (c), including biomass CO_2
2) GHG Emissions from Processes and Fugitive Sources
   - 95111 (e) – (h)
3) N_2O and CH_4 Emissions from Stationary Combustion
   - 95125 (b)
4) Distributed Emissions
   - 95112 (b) (4)
     A. Topping Cycle Plants
     B. Bottoming Cycle Plants

Types of Cogeneration

- Topping Cycle Plants
  - Energy input used to produce useful power output
  - Waste heat used to provide useful thermal energy
- Bottoming Cycle Plants
  - Energy input applied to useful thermal energy
  - Waste heat used for power production

§95112(b)(4) Distributed Emissions

- Topping Cycle Plants
  - Efficiency Method
  - Distributed between Thermal Energy and Electricity Generation
- Bottoming Cycle Plants
  - Detailed Efficiency Method
  - Distributed between Manufactured Products, Thermal Energy, and Electricity

Inputs for Emissions Distribution

- Facility level and generating unit information by fuel type:
  - F = Total fuel input, MMBtu
    - For bottoming cycle plants, include stationary combustion associated with manufacturing product and supplemental firing.
  - E_T = Emissions from stationary combustion, metric tonnes CO2
    - For bottoming cycle plants, include emissions from stationary combustion associated with manufacturing product and emissions from supplemental firing.

Inputs for Emissions Distribution

- Topping cycle and bottoming cycle:
  - P = Electric power generated, MMBtu (MWh * 3.413 = MMBtu)
  - e_P = Efficiency of electricity generation, if known
  - H = Total useful thermal output, MMBtu
  - e_H = Efficiency of thermal energy production, if known

Inputs for Emissions Distribution

- Bottoming cycle plant:
  - F_S = Fuel fired for supplemental firing in the duct burner of the heat recovery steam generator, MMBtu
  - HRSG = Output of heat recovery steam generator, MMBtu
  - H_{ST} = Input steam to steam turbine, if measured, MMBtu

Detailed Efficiency Method: GHG Emissions Distribution

Electricity	Thermal Energy
$E_P = E_T - E_H - E_M$	$E_H = \frac{H/e_H}{H/e_H + P/e_P} \times (E_T - E_M)$

Where:

E_P = Emissions distributed to electricity production

E_T = Total direct emissions of the CHP System

E_H = Emissions distributed to thermal energy production

E_M = Emissions distributed to production of manufactured product

H = Total thermal output, MMBtu

e_H = Efficiency of steam (or heat) production

P = Total electricity output, MMBtu (MWh*3.413 = MMBtu)

e_P = Efficiency of electricity generation

Comments on Cogeneration reporting requirements?

Reporting Case Study GSC and Cogeneration Facility Mix

- Determine applicability
- Identify key emission sources
- Identify calculation methods
- Compile needed input data and resources
- Calculate and report emissions
- Verification

Determine Applicability

- Manufacturing facility
- Cogeneration unit on-site
  - 2 megawatt & > 2,500 tonnes CO_2/yr
- Boilers
  - Combust 500,000 MMBtu/year
- Meets applicability for GSC (>25,000 tonnes CO_2/year) and Cogen
- Report GSC and Cogen emissions

Identify Key Emission Sources

- Boilers (2) – natural gas fired
- Cogeneration unit – natural gas (~50%) and biomass (~50%) fired
- Backup generator (exempt)
- Portable equipment (exempt)
- Mobile trucks, forklifts (voluntary reporting only)
- Energy purchases (report only use and supplier, not emissions)

Identify Calculation Methods

- Boilers
  - Use default emission factors: §95125(a) and Appendix A, Table 4
- Cogeneration
  - Compute Cogen emissions §95112
  - Calculate emissions from natural gas §95125(c)-(d)
  - Calculate emissions from biomass § 95125(c)-(d)
  - Distribute emissions §95112

Compile Needed Input Data and Resources

- Fuel use/consumption records
- Measured heat content for natural gas §95125(c) from supplier
- Biomass emissions using §95125(c) - (d)
  - Heat content, carbon content

Calculate and Report Emissions

- Calculate emissions
- Report using ARB reporting tool
- Facility official certifies data
- Verification of data

Verification, Final Steps

- Contract with verification body
- Verifier conducts a data review
- Revise emissions data report as needed
- Verification body issues verification opinion
- Reporting complete
  - Maintain records
  - Prepare for next year

Comments on GSC and Cogen Case Study?

Verification
(§95130-95133)

- Requirements
- Accreditation
- Conflict of Interest

Third-Party Verification Required, Starting in 2010

- Facilitates linkages and is consistent with international standards
- Experience with voluntary reporting (CCAR) shows the need
- Broad set of sources, complex calculations demand expertise
- Will enhance the credibility and value of emissions reports

Annual or Triennial Verification

- Annual third-party verification for:
  - Refineries
  - Hydrogen plants
  - Oil and gas production facilities
  - Retail providers
  - Fossil-fueled power plants and cogeneration facilities ≥ 10 MW
- Third-party verification required at least triennially for other sources

Verification Services

- Verification Plan
- Site visits to identify sources and review data management systems
- Sampling Plan
  - Assess uncertainty risk of data management system, data acquisition equipment, emissions calculations
  - Ranking of most significant and uncertain sources
- Data checks focus on areas with high risk of uncertainty as determined in sampling plan

Verification Services

- Comparison of verifier data checks with reported data
- Overall differences exceeding 5 percent are considered significant
- Verification products
  - Detailed report to facility
  - Verification opinion to both facility and ARB

Pre-verification Process

- ARB will approve verification teams before verification activities take place
- Teams must demonstrate acceptable level of conflict-of-interest and expertise for verifying the facility they contract with
- Team must include a specialist for retail provider, marketer, petroleum refinery, hydrogen plant, cement plant

Conflict of Interest

- Term Limit
  - Verification body to be changed after 6 years of verification services (two cycles)
  - Allowed to resume with client after 3 years off (one cycle)
- Conflict of Interest Policy
  - Verification body and verifier may not provide both consulting and verification services within a 3-year period.

ARB Accreditation

- Verification Bodies
- Lead Verifiers
  - ‘Grandfathering’ of lead verifiers
- General Verifiers
- Sector Specific Verifiers
  - Electricity Transactions
  - Refineries and Hydrogen Plants
  - Cement Plants

Verification Oversight

- ARB staff responsible for enforcing regulation
- Verification process will assist compliance efforts
- Targeted review of submitted data and verifiers

Verification Guidelines Development

- ARB is drafting verification implementation guidelines to present requirements in easy-to-follow format
- Information on training/accreditation will be posted later

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GHG Emissions Verification Website

http://www.arb.ca.gov/cc/reporting/ghg-ver/ghg-ver.htm

Verification Comments?

Next Steps

- Technical Discussions by Sector
- ARB Staff is writing GHG reporting support documents
- Call or e-mail staff with your questions
- Training Opportunities (reporting and verification)
- Draft Reporting Tool

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GHG Mandatory Reporting Website
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Thank you for attending.